

REMARKS

Claims 1, 4, 6-9, 14-17, 22-25, 30-38, and 42-49 are pending in this application.

Claims 1, 25, 33 and 42 are amended herein. Claims 47 to 49 are newly added.

The Rejections Under 35 U.S.C. §112

1. Claims 1, 4, 6-9, 14-17, 22-24, 33-38, 42-43, and 46 are rejected under 35 U.S.C. §112, first paragraph. In particular, the Office Action states that there is not sufficient support in the specification for the recitation “wherein the total amount of silica is up to 110 phr.” The Office Action acknowledges that there is support in the Examples for silica being present in discrete amounts of 80, 90, 95, 100, 105 and 110 phr. Accordingly, claims 1 and 42 are amended herein to recite a silica amount of 80 to 110 phr.

Claims 36 and 46 recite that the total amount of silica is above 100 phr. These claims depend respectively from claims 1 and 42, which set an upper limit of silica content at 110 phr. Therefore, the range of silica amount covered by these claims is above 100 phr up to 110 phr. Support for this recitation is found in the Examples, wherein silica amounts of 105 phr and 110 phr are disclosed.

As indicated in MPEP §2163 it is not necessary for support in the specification to be in haec verba, as long as newly added claim limitations are supported through express, implicit or inherent disclosure. An exemplified range of silica amount from 80 to 110 phr in discrete amounts (80, 90, 95, 100, 105 and 110) is sufficient to support recitation of “from 80 phr to 110 phr” as now recited in claims 1 and 42. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

2. Claims 1, 4, 6-9, 14-17, 22-25, 30-38, and 42-46 are rejected under 35 U.S.C. §112, second paragraph as being indefinite. In particular, the Office Action states that the term “hardness increasing amount” is not defined by the claims.

Claims 1 and 42 as amended define the hardness increasng amount to be “sufficient to achieve a Shore A hardness of the silica/rubber mixture of from 56 to 63 and which is above the amount necessary to achieve an equivalent Shore A hardness of the silica/rubber mixture as compared with the use of an equivalent molar amount of bis (triethoxysilylpropyl disulfide) as the silane.” Support for recitation of the range of Shore A hardness of 56 and 63 can be found in the specification in the Examples 6-12. See Tables at page 74-80 of the specification. Applicants respectfully submit that one skilled in the art is sufficiently apprised of the scope of what is being claimed.

Claim 33 is amended to recite that the method of claim 1 further includes the step of blending carbon black into the mixture, thereby no longer relating the recitation to the Markush group of claim 1.

Claim 42 is amended to correct the wording of the Markush group.

Reconsideration and withdrawal of the rejection are respectfully requested.

The Rejections Under Prior Art

1. Claims 1, 4, 6-9, 14-17, 22-24, 33-34, 36, 42-43 and 46 are rejected under 35 U.S.C. §102(b) as being anticipated by WO 99/09036 (hereinafter, “Cruise”)

The Office Action states:

Cruise discloses the Shore A hardness of the composition ranges from the upper 50's to the mid 60's which are typical of the hardness in applicants' specification. Thus, since Cruise has the same components and similar hardness values to applicants' composition, it is inherent that the components' present have caused an increase in hardness similar to the applicants'.

Applicants wish to point out that the invention is related to increasing the hardness of silica/rubber mixtures. Fillers such as silica are added to tire compositions to improve performance characteristics, strength, wear resistance, fatigue resistance, hysteresis and the like. Coupling agents such as silanes are added to couple the silica particles to the matrix polymer to reduce filler - filler interactions, improve the dispersion of the filler and result in improved tire performance characteristics including lower hysteresis, improved wet and ice traction, and high abrasion resistance. However, these performance improvements are usually accompanied by loss of dynamic stiffness (i.e. hardness) of the filled rubber. Polysulfid silanes (e.g. TESPT and TESPD) tend to reduce hardness, and blocked mercaptosilanes reduce hardness even more, although blocked mercaptosilanes are preferred for their improvement in performance characteristics.

As described in the specification at pages 13 and 14, separation of filler-filler interactions achieved by the addition of the silane coupling agent reduces network effects and thereby tends to decrease hardness. On the other hand, creation of silica-rubber bands by the coupling agent tends to increase hardness by enhancing bound rubber content and hydrodynamic interactions of the filler. However, in the case of the preferred blocked mercaptosilanes, such as 3-octanoylthio-1-propyltriethoxysilane, the hardness decrease from reduced network effects is greater than the

increase in hardness due to silica dispersion and silica-rubber coupling. Therefore, there is an overall decrease in hardness. The object of the present invention is a method of using the preferred blocked mercaptosilanes, particularly 3-octanoylthio-1-propyltriethoxysilane, while retaining hardness levels comparable with those of TESPT and TESP. It has been found by Applicants herein that employing an amount of silica in conjunction with the blocked mercaptosilane coupling agents higher than that conventionally used is effective for increasing the hardness to desired levels.

The Office Action states that the components in Cruise would have inherently caused an increase in hardness similar to Applicants'. However, Cruise does not disclose or discuss the problem, nor does Cruise even suggest Applicants' solution of employing higher than normal loadings of silica filler. The fact that Cruise discloses 3-octanoylthio-1-propyltriethoxysilane does not mean that Applicants' claimed method is also disclosed or suggested.

For example, claim 6 limits the claimed silane to 3-octanoylthio-1-propyltriethoxysilane. As can be seen from Example 10 of the specification (Table at page 78 of the specification) use of 80 phr of silica in conjunction with TESP resulted in a silica/rubber mixture having a Shore A hardness of 58 and a coupling strength (M300%/M100%) of 5.3. Use of 80 phr of silica in conjunction with 3-octanoylthio-1-propyltriethoxysilane (designated as NXT) provided a higher coupling strength (5.8) but lower hardness (54). However, increasing the amount of silica to 100 phr in conjunction with 3-octanoylthio-1-propyltriethoxysilane provided increased hardnesses (59, 58, 58) as well as better coupling.

Cruise at page 50 presents Table 5 which shows that 3-octanoylthio-1-propyltriethoxysilane (designated as E) provides a Shore A hardness of 53 and 55. The amount of silica was 80 phr. Therefore, Cruise does not disclose Applicants' invention as generally recited in claim 1. Moreover, claim 6 herein, which limits the silane to 3-octanoylthio-1-propyltriethoxysilane is even further distinguished over Cruise. Accordingly, claims 1 and 42 and all claims depending therefrom are submitted to be allowable over Cruise. Reconsideration and withdrawal of the rejection are respectfully requested.

2. Claims 35 and 37 are rejected under 35 U.S.C. §103(a) as being obvious over Cruise in view of U.S. Patent No. 5,341,843 (hereinafter, "Sandstrom"). Sandstrom is directed to a tire with tread composition and is cited for disclosing a pneumatic tire tread containing low density polyethylene (LDPE). However, Sandstrom does not disclose the use of blocked mercaptosilane coupling agent(s) of the invention or the method for increasing hardness of silica/rubber mixtures as claimed herein. Sandstrom adds nothing which would cure the deficiencies of the Cruise reference as discussed above. Accordingly, claims 35 and 37 are submitted to be allowable. Reconsideration and withdrawal of the rejection are respectfully requested.

3. Claim 38 is rejected under 35 U.S.C. §103(a) as being obvious over Cruise in view of JP 2000-319451 ("Kikuchi"). Kikuchi is directed to a tire tread rubber composition.

Kikuchi does not disclose the use of blocked mercaptosilane coupling agent(s) or the method for increasing hardness of silica/rubber mixtures as claimed herein. Kikuchi adds

nothing which would cure the deficiencies of Cruise as discussed above. Accordingly, claim 38 is submitted to be allowable. Reconsideration and withdrawal of the rejection are respectfully submitted.

4. Claims 25, 30-32, and 44-45 are rejected under 35 U.S.C. §103(a) as being obvious over Cruise in view of U.S. Patent No. 5,623,028 (hereinafter, "Fitzgerald"). Fitzgerald does not disclose the use of blocked mercaptosilanes. Fitzgerald is directed to the use of a silicane rubber composition. The MQ resin is incorporated into the silicone as a mold release agent (Col. 2, lines 12-15). One skilled in the art would find no suggestion to employ the MQ mold release agent of Fitzgerald intended for a silicone into the tire composition of Cruise. Moreover, the present claims are directed to the use of MQ resin as a hardness increasing component, not a mold release agent. Accordingly, there is not sufficient bases for the combination of these references. Moreover, Fitzgerald does not cure the deficiencies of Cruise discussed above. Even if these references were to be combined Applicants' claimed invention would not be disclosed or suggested. Reconsideration and withdrawal of the rejection are respectfully requested.

The New Claims:

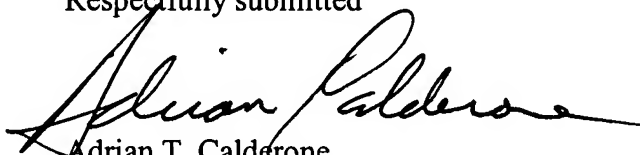
New independent claims 47 and 48 are directed respectively to a method and article of manufacture relating to silica/rubber mixtures including a hardness increasing amount of silica and 3-octanoylthio-1-propyltriethoxysilane coupling agent.

Claim 49 depends from claim 25 and recites specific rubbers as disclosed at pages 49 to 50 of the specification. Silicones are not within the group of specified rubbers. Hence, claim 49 is further distinguished over Fitzgerald, which is directed to silicone rubbers.

CONCLUSION

For at least the reasons stated above all of the pending claims are submitted to be in condition for allowance, the same being respectfully requested.

Respectfully submitted

A handwritten signature in black ink, appearing to read "Adrian T. Calderone", is written over the typed name.

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